



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 6  
1445 ROSS AVENUE, SUITE 1200  
DALLAS TX 75202-2733

June 17, 2014

Mr. Richard A. Hyde, P. E.  
Executive Director,  
Texas Commission on Environmental Quality (TCEQ)  
Post Office Box 13087  
Austin, Texas 78711-3087

RE: Partial Withdrawal and Partial Reaffirmation of a UIC Program Revision establishing an Aquifer Exemption for uranium mining in a portion of the Goliad Aquifer near Ander, Texas in Goliad County

Dear Mr. Hyde:

The U.S. Environmental Protection Agency (EPA) has completed its review of the Goliad aquifer exemption requested by the Texas Commission on Environmental Quality (TCEQ), on behalf of Uranium Energy Corp. (UEC), approved by the EPA on December 4, 2012, by letter from Mr. William Honker to Mr. Zac Covar. EPA revisited this decision as a result of a petition for review filed by a group of interested citizens (Petitioners) on January 18, 2013, challenging EPA's final agency action in the Fifth Circuit Court of Appeals (Case No. 13-60040). Petitioners requested that the Court vacate the aquifer exemption. Of particular concern to the Petitioners was the water level data that UEC submitted to EPA after the conclusion of the State's public notice and comment period. In response, EPA asked the Court for a voluntary remand of the aquifer exemption decision without vacating the exemption to allow the Agency to offer its own opportunity for public notice and comment. The Court granted EPA's request, and therefore, EPA solicited the submission of any data, including any comments on the UEC submitted data not previously made widely available, which could assist EPA in its review. EPA also held a public hearing on the approval of the aquifer exemption at which it received numerous oral comments.

A thorough review of the public comments raised uncertainty regarding the quality of existing water level data, as well as the accuracy of the original methods used to survey existing wells. As a result of these concerns, on March 24 and 25, 2014, EPA traveled to Goliad, Texas, to witness the acquisition of additional survey data. Following the re-surveying of existing wells by a state licensed and certified surveyor, UEC collected a new set of fluid level measurements with EPA witnesses. Using the data acquired from the March 2014 field excursion, EPA made additional contour maps for comparison to previously existing contour maps and data sets.

In the area of the Goliad aquifer exemption, there are two near-parallel faults (the Northwest Fault and the Southeast Fault), which are almost vertical in orientation, and trend in an approximate southwest to northeast direction. The two fault planes place the majority of the requested Goliad aquifer exemption area within a geologic feature known as a graben, a land mass between the faults that has dropped over time. Based on the prior information available to EPA, the analysis of the March 2014 data set, and additional data received during public comment period, EPA is reaffirming its original interpretation of a general west to east ground water flow direction with localized variations within the graben.

Moreover, EPA believes there is sufficient geologic data and ground water elevation data to characterize the ground water flow direction in the graben. The March 2014 data reinforces EPA's December 2012 conclusion that the capture zones of nearby drinking water wells do not intersect the exemption area within the graben. As such, EPA is reaffirming its approval of an aquifer exemption under the criteria provided in Title 40 of the Code of Federal Regulations (C.F.R.) § 146.4 for the previously exempted area within the graben. However, for the previously exempted area north of the Northwest Fault outside the graben, EPA is withdrawing its approval of that portion of the aquifer exemption.

EPA concludes that the portion of the aquifer reaffirmed for exemption meets the criteria for exemption as follows:

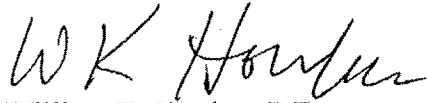
- 40 C.F.R. § 146.4 (a): It does not currently serve as a source of drinking water; and
- 40 C.F.R. § 146.4 (b)(1): It cannot now and will not in the future serve as a source of drinking water because it has been demonstrated by permit application to contain minerals that, considering their quantity and location, are expected to be commercially producible.

The extent of the exempted portions of the Goliad Formation are described and depicted in the Statement of Basis (enclosed) and attachments thereto.

With respect to the portion of the exemption north of the Northwest Fault, EPA agrees with the comments presented during its notice and comment period that there is a significant lack of ground water elevation data for this area. Additionally, the potential recharge area and concerns about the potential effects from the fault on the ground water flow direction north of the Northwest Fault are considerations that warrant additional data and analysis. Of the four domestic wells of concern north of the fault, only two have known depths and are considered to be completed in the B sand. Additionally, current fluid levels are below those previously measured. EPA cannot accurately determine whether the area would currently act as a source of drinking water because of the lack of data needed to determine the ground water flow direction north of the Northwest Fault. EPA finds that insufficient technical data north of the Northwest Fault are available to warrant proceeding with the request as approved on December 4, 2012. As stated above, EPA is withdrawing the portion of the approved aquifer exemption north of the Northwest Fault outside the graben area. EPA is open to reconsidering an exemption request for the area north of the Northwest Fault in the future if sufficient data and analysis are developed to warrant reconsideration.

EPA and TCEQ share the mutual goal of assuring the protection of underground sources of drinking water. We look forward to continuing our work together to meet that goal. Please feel free to contact me or have your staff contact Mr. Philip Dellinger, Chief of the Ground Water/UIC Section at (214) 665-8324, if you'd like to discuss this decision.

Sincerely yours,

A handwritten signature in black ink, appearing to read "W K Honker".

William K. Honker, P.E.

Director

Water Quality Protection Division

Enclosure

cc: Brent Wade, TCEQ

# Statement of Basis

## EPA Reconsideration of Goliad Aquifer Exemption

June 2014

### I. Background

Congress enacted the Safe Drinking Water Act (SDWA), 42 U.S.C. §00f - 300j-26, in 1974 to ensure that the nation's sources of drinking water are protected against contamination. Accordingly, SDWA requires EPA to have regulations establishing minimum requirements for State underground injection control programs. 42 U.S.C. §300h-1; *see* 40 C.F.R. §144.1. Once EPA approves a State's program as meeting the requirements of SDWA, the State has "primary enforcement authority" and is responsible for implementing its approved program. The purpose of underground injection control (UIC) regulations is the protection of underground sources of drinking water (USDW) from endangerment as a result of underground injection. A USDW is defined broadly in EPA's regulations at 40 C.F.R. §144.3 to include an aquifer or its portion: (a) (1) which supplies any public water system; or, (2) which contains a sufficient quantity of ground water to supply a public water system; and (i) currently supplies drinking water for human consumption; or (ii) contains fewer than 10,000mg/l total dissolved solids; and is not an exempted aquifer.

In recognition of the broad definition of USDWs and the commercial use of underground injection, an aquifer may be designated as an "exempted aquifer." These are aquifers that would otherwise qualify as USDWs but meet criteria for exemption in 40 C.F.R. §146.4. As relevant here, those criteria contained in 40 C.F.R. §146.4(a)-(b) provide:

An aquifer or portion thereof...may be determined to be an "exempted aquifer" if:

- (a) It does not currently serve as a source of drinking water; and
- (b) It cannot now and will not in the future serve as a source of drinking water because:
  - (1) It is mineral, hydrocarbon or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or Class III operation to contain minerals or hydrocarbons that, considering their quantity and location, are expected to be commercially producible.

A State's designation of an exempted aquifer is not effective until EPA approves the designation as part of the initial State program approval or revision thereto. If a State with an EPA approved program identifies an exempted aquifer after initial program approval, the State is required to provide public notice and an opportunity for a public hearing on the aquifer exemption. Then the State must submit the exemption to EPA for review.

In May of 2011, the Texas Commission on Environmental Quality (TCEQ) requested EPA approve an aquifer exemption for a portion of the Goliad Aquifer as a non-substantial revision to its approved UIC program (Citation 1). The effect of EPA's approval of an aquifer exemption, as explained above, is that the portion of the aquifer covered by the exemption is no longer

protected as an USDW under the SDWA. Along with the permit issued by TCEQ, the exemption allows the applicant, UEC, to operate an in-situ uranium mining operation within the exempted area of the aquifer.

Although EPA must approve all revisions to EPA-approved State UIC programs, the process differs depending on whether EPA treats it as a substantial or non-substantial program revision. EPA treated this as a non-substantial program revision because it is associated with the issuance of a site-specific Class III UIC permit action, not a state-wide programmatic change or a revision with implications for the national UIC program. The decision to treat this as a non-substantial program revision is also consistent with EPA's Guidance 34 (Citation 2) and historic practice for aquifer exemption requests related to in situ mining operations in Texas. EPA's Guidance 34 (July 1984), indicates that the determination as to whether a program revision is substantial or non-substantial will be made on a case-by-case basis, but suggests that the Agency will treat revisions as "substantial" if they are exemptions of high quality aquifers (less than 3,000 mg/TDS) related to Class I wells, or exemptions not related to action on a permit. See also 48 Fed. Reg. 40098, 40108 (1983). The Goliad Aquifer Exemption request does not fall within any of these categories. Although this as a non-substantial program revision, which does not require formal notice and comment, EPA did provide an opportunity for public participation (notice and comment, and a public hearing) similar to the process which would have been provided if EPA treated this as a substantial program revision

In accordance with the process outlined above, prior to requesting EPA approval, TCEQ provided public notice of the aquifer exemption and conducted a hearing. After a detailed evaluation of the request, EPA approved the aquifer exemption on December 4, 2012 (Citations 3 and 4). On January 18, 2013, a group of interested citizens filed a petition for review of EPA's final agency action in the Fifth Circuit Court of Appeals (Case No.13-60040) requesting that the Court vacate the aquifer exemption. In response, EPA asked the Court for a voluntary remand of the aquifer exemption decision without vacating the exemption to allow the Agency to offer its own opportunity for additional public notice and comment. In particular, EPA wanted to give the public an opportunity to review the data UEC submitted to EPA after the State's public notice and comment period had concluded. The supplemental information included ground water elevation data sets, contour maps developed from these data sets indicating the ground water flow direction, geologic cross-sections, water well capture zone calculations, aquifer pump test data, and related maps.

The court granted EPA's request, and therefore EPA provided public notice of EPA's reconsideration of the aquifer exemption approval (Citation 5). EPA provided the public with an opportunity to submit written comments from January 8, 2014 to February 14, 2014. EPA also held a public hearing where the public had an opportunity to make oral comments. EPA received many comments, including comments on information that was available during TCEQs public comment process, and considered all comments in formulating its decision. The public hearing was transcribed and is available with all comments EPA received online at: <http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/index.html>

## II. Key Issues

EPA's previous approval of the aquifer exemption was based in part on a demonstration that no nearby drinking water wells would produce water from the exemption area over their lifetimes. EPA largely relied on ground water data showing the direction of ground water flow. Like surface water, ground water flows from areas of higher elevation or pressure to areas of lower elevation or pressure. Ground water in the area of the exemption exists in the pore spaces between individual sand grains of four sandstone formations below ground, and flows by moving through these pore spaces. There are four sandstone layers in the portion of the Goliad aquifer considered in this exemption identified as Sands A, B, C, and D. They are vertically separated by individual clay layers, which are relatively impermeable to ground water flow. Although ground water movement in this area is very slow compared to movement of surface water, it plays an important role in projecting the current geographic location of water that will be produced by a water well over its lifetime. This area is referred to as the well's capture zone.

Generally, ground water in the larger area surrounding the exemption area naturally flows to the southeast. During EPA's evaluation process, UEC asserted the ground water flow direction in the exemption area is eastward due to the effects of two nearby geologic faults on the southeastward regional ground water flow direction. A geologic fault is a fracture in rock, along which there is movement. In the area of the Goliad aquifer exemption, there are two near-parallel faults (Northwest Fault and Southeast Fault), which are almost vertical in orientation, and trend in an approximate southwest to northeast direction (see two attached maps). The two fault planes place the majority of the Goliad aquifer exemption area within a geologic feature known as a graben, a land mass between the faults that has dropped over time.

The ground water data EPA largely relied on in this aquifer exemption analysis are water level elevation measurements measured in wells located in the exemption area to determine the ground water flow direction within the graben. Over the course of EPA's assessment, it received and considered ground water elevation data collected on five separate occasions: September 2008, March 2010, February 2012, September 2012, and March 2014 (Citations 6 and 7). These elevation measurements were plotted on maps and contoured by EPA geologists (Citation 8). Since ground water flows from higher to lower elevations, the resulting maps provide the direction of ground water flow.

In its original decision (December 2012), EPA concluded the ground water flow direction within the graben was in fact eastward based on its independent analysis of the first four sets of data mentioned above. EPA concluded the two faults constrict the southeastern regional flow of ground water, and result in a localized eastward ground water flow direction within the graben. For areas north of the graben, EPA assumed the flow direction was southeastward, consistent with the regional background flow direction.

Several of the comments submitted during EPA's 2014 comment period presented technical arguments and supporting data that EPA had not previously considered. These comments fall into two general categories:

**Direction of Ground water Flow North of the Northwest Fault.** One comment in particular questioned the global lack of data north of the Northwest Fault and EPA's assumption of the southeastern direction of ground water flow in this area (Larry Dunbar, Citation 9). The comment suggested this area could be a ground water recharge area, which is an area where fresh water, primarily from rain, is able to percolate into the aquifer and thereby provide recharge to the aquifer. Recharge in this area, along with the effects of the Northwest Fault, could significantly alter the direction of ground water flow in this area. The comment outlined several pieces of evidence supporting a recharge area. Sand A appears to outcrop at the surface, thus putting it into communication with precipitation or surface water bodies. The one ground water elevation point in the area appeared to indicate an anomalously high water elevation in this area, which would be expected in a recharge area. Also, the area includes a topographic high (see attached site maps including topographic contours), which would be consistent with higher ground water elevations. If it is true that a recharge area exists, the comment brings into question how EPA could be certain that the ground water did not flow outward from the recharge area towards the domestic water wells located north of the exemption boundary, instead of to the southeast.

**Direction of Ground water Flow between the Faults.** Other comments questioned UEC's position that some ground water level measurements were "outliers" and should be omitted from consideration. Also, one comment included visual graphs of historic ground water data sets, two of which EPA did not consider because they were not submitted during EPA's analysis. After a reexamination of the data submitted by UEC, EPA observed that what should be relatively stable and consistent measurements of casing height above ground surface and surface elevation of the well above sea level, actually varied significantly year to year. Follow-up discussions with UEC regarding the manner in which these key measurements were acquired and the two additional data sets created additional concerns about the data EPA had relied upon to conclude a west to east ground water flow direction. As a result, from March 24-25, 2014, EPA representatives traveled to Goliad to witness collection of an additional set of ground water elevation measurements. The goal was to determine if these variations could have had a significant impact on EPA's previous findings.

### III. Additional Data and Analysis

On March 24 and 25, 2014, four EPA representatives traveled to Goliad to witness the acquisition of a new set of ground water elevation data (see Trip Summary attached). To determine the elevation of ground water in a well, both the elevation of the well casing top and the measured depth to the water level from the casing top are needed. For this new data set, EPA requested that UEC use a state licensed and certified surveyor, instead of UEC employees, to survey the casing top elevations. UEC hired the Black Gold Surveying & Engineering firm and EPA witnessed some of the surveyor's activities during the first day. On March 25, EPA accompanied UEC representatives to witness UEC's measuring of water levels in perimeter Sand B monitor wells (BMW-1 through BMW-22) and 27 interior wells (14 pump test wells, 9 monitor wells, and 4 regional base line Sand B wells ) (Citation 7).

EPA also visited the possible recharge area north of the Northwest Fault and found the soil

appeared slightly sandier than the soil south of the Northwest Fault, within the graben indicating possible surface exposure of Sand A. EPA also observed the topographic high in the area referenced in the Dunbar comment (Citation 9, pages 2-3). EPA had previously confirmed using cross-sectional data provided in UEC's application that Sand A appears to outcrop directly north of the fault. During the field investigation, EPA inquired about a single high Sand A ground water elevation point measured north of the Northwest Fault in September 2008. UEC attempted to re-measure the water level in this well in EPA's presence, and found the well to have no water level. The well's depth was only approximately 3.5 feet lower than the fluid level reported in the September 2008 data. UEC proposed the September 2008 water level measurement was likely remnant water in the bottom of the well unintentionally left there after well completion activities. EPA concluded that because other measured fluid levels collected in this recent investigation were several feet lower than past data sets, the absence of a water level in the well could also be attributable to the drought the area is currently experiencing. Consequently, EPA could make no definitive conclusion on the September 2008 high elevation measurement.

On March 27, two days after EPA's field trip, UEC reported that the measured value for one well appeared anomalous and was being re-measured (well PTW-1). The measurement was about 1.5 feet lower than that measured values for surrounding wells. UEC provided re-measured values for this well on March 31. These values were more consistent with values from surrounding wells acquired during EPA's visit. However, EPA contoured the site based solely on the water level measurements witnessed by EPA staff because EPA had not been present during the UEC re-measurements (Citation 11). Two new maps of Sand A ground water elevations independently generated by EPA staff exhibit an eastward ground water flow direction within the Sand B mining area. Three new Sand B contour maps created by EPA using the March 2014 data also show an eastward flow direction for Sand B ground water in this area, as well as two localized water level depressions. Despite these depressions, the contour maps were consistent with EPA's previous findings that the ground water flow direction is predominantly from west to the east within the Sand B monitor well ring (which is within the graben) at the Goliad site (Citation 12).

#### IV. Reaffirmation of Aquifer Exemption for area within the Graben

Based on the record of this proceeding, including the new data provided during the comment period, EPA is confirming its approval of the aquifer exemption within the graben.

**Ground water within the graben.** As discussed above, EPA's analysis of the data confirms that ground water flow direction is predominantly from west to east within the graben. In addition, in its original decision on the Goliad aquifer exemption, EPA evaluated vertical isolation of the Sand B mining area in an effort to assure isolation of the Sands B, C, and D from Sand A since Sand A is not exempted in this area. The record supports a finding of sufficient vertical stratigraphic isolation of the four sands planned for mining to assure no impacts to the capture zones of existing wells. This finding is supported by a number of cross-sections over the entire area covered by the exemption showing laterally continuous clay layers separating the four sands (Citation 13). EPA initially had concern over possible vertical communication between the many exploratory wellbores (Citation 14). These wellbores exist across the area and could potentially allow fluid flow between formations if not properly plugged. Plugging records for



exploratory wells drilled by a previous mineral lease holder were apparently purged from Railroad Commission files many years ago. However, EPA analyzed this concern by evaluating the results of a 33 hour pump test conducted by UEC within the eastern half of the Sand B ore body (Citation 15). The pump test was used, among other purposes, to detect possible communication between the Sands A and B over the eastern region of the B sand ore body. The test indicated vertical isolation of the B sand in the test area. Because hydraulic isolation was demonstrated in a localized area where extensive early drilling had occurred, EPA believes that it is reasonable to assume exploratory wells from that earlier phase of exploration in other portions of the exempted area were similarly plugged and would not compromise the isolation provided by the clay layers.

As a result of EPA's additional investigation associated with evaluation of public comments, EPA discovered a pump test conducted on PTW-1 in the contested case hearing records. Well PTW-1 is located in the western part of the Sand B mining area. EPA's analysis of this test indicated possible vertical communication between Sand A and Sand B near well PTW-1. Despite this information, EPA has determined it does not impact capture zones of existing drinking water wells because of the eastward gradient in the graben. EPA however, contacted TCEQ to inform them of this situation, and recommended that TCEQ investigate the matter prior to commencement of mining in Sand B (Citation 16).

**Ground water south of the mining area.** EPA used the five ground water elevation data sets (September 2008, March 2010, February 2012, September 2012, and March 2014 (see Citations 6, 7, 8, 12) in conjunction with the geologic characteristics (constriction of southeastward ground water flow by faults associated with the graben) of the site to conclude an eastward direction of ground water flow exists in the entire area between the two faults comprising the graben. The change in the regional ground water flow direction, from a general southeastern direction to an eastern direction in the graben, is concluded to be a result of the two near-parallel geologic faults bounding the graben. Vertical offset of formations along the faults because of dropping of the area between the two faults, and the resulting impacts (clay smear) to the surface of sandstone layers adjacent to the faults are believed to provide at least a partial restriction to the regional southeastern ground water flow, causing ground water to enter the westward end of the graben and move eastward through the graben as exhibited in the Sand B mining area. In summary, the graben orientation with respect to regional ground water flow is interpreted to deflect the southeastern regional ground water flow to a more west to east flow direction inside the graben.

Because of the graben, EPA expects that the demonstrated west to east direction of ground water flow within the Sand B ore body extends to the community of Ander. Ander lies slightly more than ¼ mile to the southeast of the Sand B monitoring well ring and is where some drinking water wells exist. When EPA applies the ground water flow direction interpreted within the graben to these drinking water wells, the water to be captured by the wells comes from the west and not from the proposed exemption area to the northwest.

**Ground water northwest of the mining area.** In EPA's original decision (December 2012) on this matter, the domestic wells to the northwest were assumed to be upgradient of the exemption

area because of the regional southeastward ground water flow direction. Because of the limited water level or other data and evidence of possible recharge area north of the Northwest Fault, EPA concludes there is insufficient data to support this previous assumption. EPA is therefore modifying the exemption area to only include the area within the graben as indicated on the attached Maps. EPA believes the eastward ground water flow direction in the graben provides assurance that capture zones for existing drinking water wells north of the Northwest Fault do not intersect the exemption area within the graben, as required by the “current source” criterion at 40 CFR §146.4 (a). Moreover, the fault will provide an additional barrier to northern movement of ground water outside of the exemption area.

**Transmissivity of the faults.** The two faults comprising the graben described above received considerable attention in both the TCEQ permit process and EPA’s review of aquifer exemption related material. Of specific interest was if the faults allow water to flow vertically along the faults or horizontally across the faults (vertical and horizontal transmissivity). Because the faults penetrate the vertically isolated clay layers discussed above, hydrologic communication between sand zones along the fault plane is possible. Cross-sections constructed from penetrations in the area indicate sand-to-sand contacts across the fault. These may allow some flow of ground water across the fault.

EPA never concluded the faults that create the graben were completely non-transmissive to flow. Instead, the Agency acknowledges some flow along and/or across the northern fault may occur, particularly in times of aquifer recharge. However, based on its evaluation of all available data (including the March 2014 data set) and public comments received, EPA concludes that the faults related to the graben cause a constriction to the regional southeastward ground water flow, and that a resulting overall eastward flow direction exists in the graben despite localized and/or temporal variations. The possibility of fault transmissivity does not impact EPA’s evaluation of whether the current use criterion has been met because, due to the ground water flow direction, the capture zones of nearby drinking water wells do not include water from within the exemption boundaries.

**Summary of findings for ground water between the faults.** In summary, the approval of the exemption is based on the hydrologic isolation of the capture zones for drinking water wells near the exempted area, thus meeting EPA’s first regulatory criteria at 40 CFR 146.4(a) that the proposed exemption does not currently serve as a source of drinking water. EPA further determined that the application met the second criterion of 40 C.F.R. 146.4(b), the “future source” criterion, because UEC’s permit application demonstrates that the aquifer contained commercially producible levels of uranium. The exemption area extends from the base of Sand D to the top of the Sand D. Horizontally, the exemption area for Sand A (purple outline on attached maps) is significantly smaller than that for Sands B, C, and D (red line on attached maps). This decision modifies the horizontal extent of EPA’s December 2012 decision. The exemption area approved in this decision does not extend north of the Northwest Fault.

Based on the findings from the additional data set that EPA witnessed, EPA remains convinced that its original interpretation of general west to east ground water flow direction exists within the graben, with variations that don’t impact the overall capture zone analysis because they are

localized. Because sufficient geologic and ground water elevation data exist to characterize the ground water flow direction in the graben, EPA is reaffirming its approval of an aquifer exemption for the area within the graben. These data confirm the capture zones of nearby drinking water wells do not intersect the exemption area within the graben.

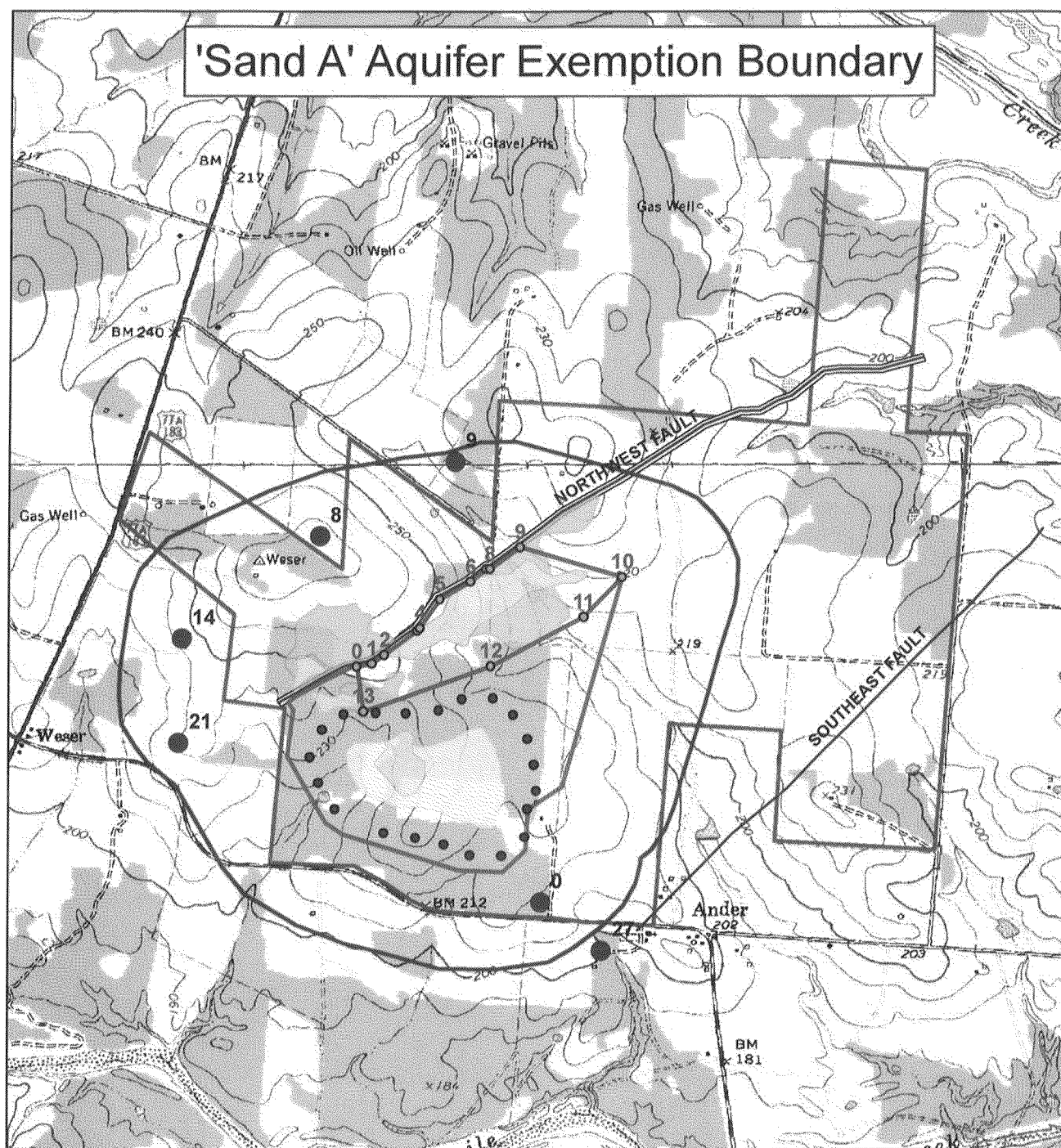
#### V. Withdrawal of Aquifer Exemption North of the Northwest Fault

With respect to that portion of the exempted area north of the Northwest Fault, EPA concludes there is a significant lack of ground water elevation data in that area. EPA received only one Sand A water elevation data point (September 2008 data set); as a result, EPA could not make a definitive finding about possible recharge or the ground water flow direction in the area. Additionally, EPA shares the concerns presented on pages 2-3 in the Larry Dunbar report (Citation 9) suggesting the possibility of a recharge area that could significantly alter the local ground water flow direction on the north side of the Northwest Fault. In addition, of the four domestic wells of concern, only two have known depths and are considered to be completed in the Sand B. Without the necessary depth and flow data and given the evidence that it is a possible recharge area, EPA could not evaluate the capture zone of the wells in relation to the exemption area north of the Northwest Fault. As a result of insufficient technical data available to warrant reaffirming EPA's December 2012 approval in its entirety, EPA is withdrawing approval of the aquifer exemption for the area north of the Northwest Fault. The resulting modified area is shown and described in the attached maps and "Technical Exemption Area Derivation".

### Citations

1. AR00271 TCEQ Request for non-substantial program revision/aquifer exemption  
<http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/00271.pdf>
2. AR00073 GWPB Guidance #34  
<http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/00073.pdf>
3. AR00589 TCEQ amended request and EPA approval letter;  
<http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/00589.pdf>
4. AR00587 Goliad Exemption Statement of Basis for Decision  
<http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/00587.pdf>
5. Public Notice - <http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/04082014/2014-01-08-goliad-public-notice-for-goliad-aquifer-hearing-on-2-11-14-published-on-epa-website.pdf>
6. AR00495 Water Well surveys  
<http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/00495.pdf>
7. Goliad Potentiometric Levels, March 25, 2014, XCEL spreadsheet  
<http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/goliad%20trip/goliad-potentiometric-levels-march25-2014.pdf>
8. AR00507 Contour maps by EPA staff  
<http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/00507.pdf>
9. Dunbar Declaration [http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/04082014/2014-02-14-attachment-letter-from-l.dunbar-dunbar-declaration\\_exh.Aexh.1-4-to-email-from-m.conner-blackburn-carter-for-hearing.pdf](http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/04082014/2014-02-14-attachment-letter-from-l.dunbar-dunbar-declaration_exh.Aexh.1-4-to-email-from-m.conner-blackburn-carter-for-hearing.pdf)
10. Black Gold Survey Data, March 24, 2014, email from Harry Anthony dated March 28, 2014
11. ROC to Craig Holmes regarding UEC remeasured water levels  
[http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/goliad%20trip/epa-partial-response-2014\(by-craig-holmes-3-31-14\).pdf](http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/goliad%20trip/epa-partial-response-2014(by-craig-holmes-3-31-14).pdf)

12. Sand A and B contour maps by Bierschenk, Dellinger, and Frazier, pdfs
13. AR00026, AR00027, AR00028, AR00029, AR00030, AR00039, AR00040, and AR00044, stratigraphic cross sections and index map, also see page 12:  
<http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/goliad-powerpoint.pdf>
14. AR00407, map showing exploratory wellbores, also see page 14:  
<http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/goliad-powerpoint.pdf>
15. AR00001 Pump Test PTW-6 results graphic  
<http://www.epa.gov/region6/water/swp/groundwater/goliad-aquifer/00001.pdf>
16. Record of Communication, Phil Dellinger to TCEQ, 5-29-14



Coordinate System: GCS North American 1927  
 Datum: North American 1927  
 Units: Degree

0 0.1 0.2 0.4 0.6 0.8 Miles

- Drinking Water Wells
- Sand B Monitor Wells
- Sand A Exemption Area
- Sands B, C & D Exemption Area
- 1/4 mile AOR
- 50' buffer on NW fault\*\*
- Goliad Permit Boundary
- Ore Bodies**
- Sand A
- Sand B
- Sand C
- Sand D

**Sand A Exemption approximate boundary\***

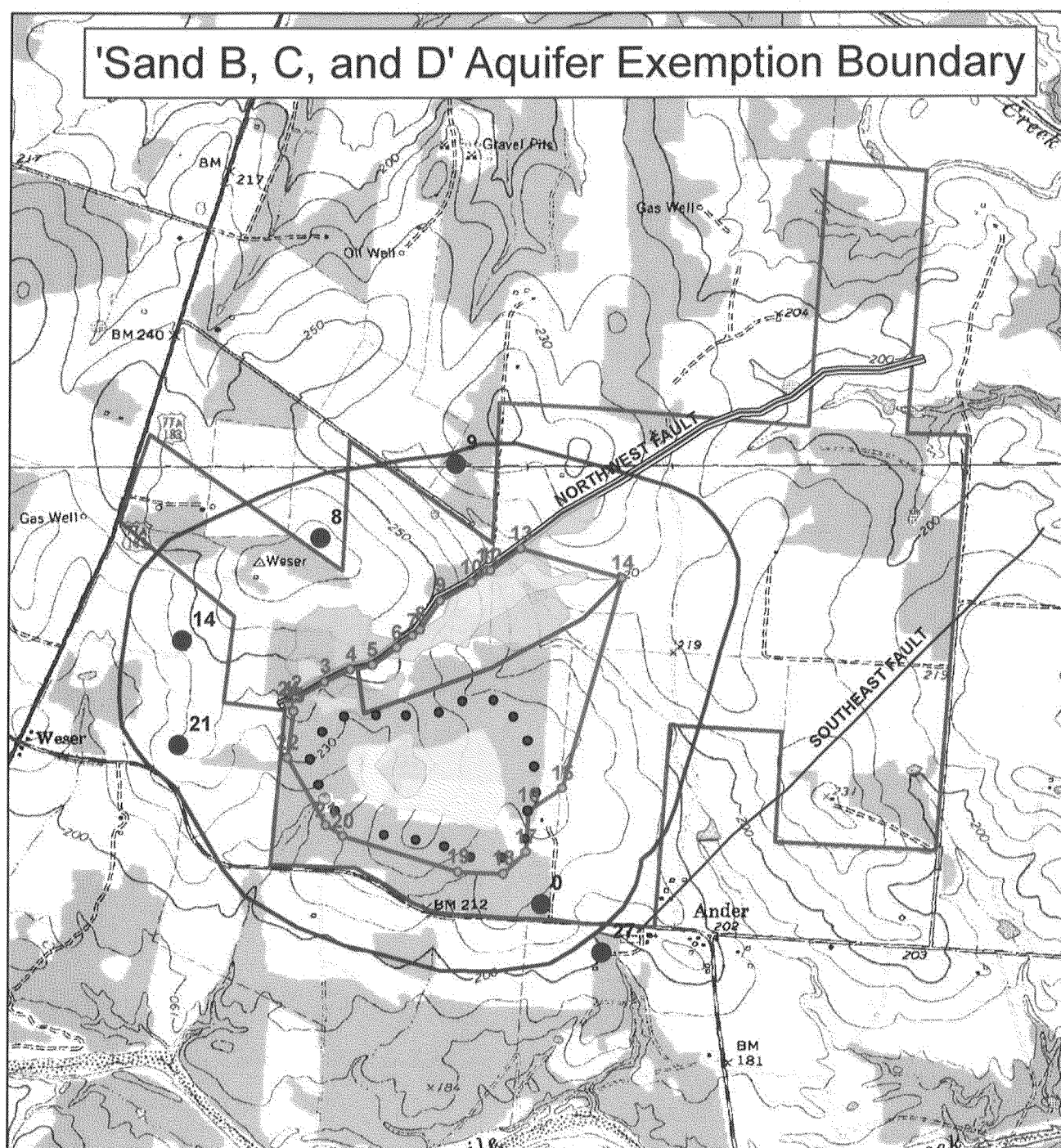
Point	X	Y	Point	X	Y
0	-97.355258	28.867592	8	-97.350428	28.871143
1	-97.354717	28.867706	9	-97.349329	28.871947
2	-97.354255	28.868018	10	-97.345631	28.870855
3	-97.353077	28.868901	11	-97.347034	28.869404
4	-97.352978	28.868991	12	-97.350389	28.867619
5	-97.352260	28.870052	13	-97.355006	28.865978
6	-97.351134	28.870681	14	-97.355258	28.867592
7	-97.350562	28.871135			

TNRIS 24000 DRG Goliad County Quadrangles:  
 Ander. Mayersville, Weesatche, Yorktown East

\* All locations traced from georeferenced UEC Map, i.e. not from coordinates.

\*\* Due to the uncertainty of the exact fault location a conservative 50 foot buffer was used to define the northern edge of the exemption area, along the SE of the NW fault.





Coordinate System: GCS North American 1927

Datum: North American 1927

Units: Degree

0 0.1 0.2 0.4 0.6 0.8 Miles

- Drinking Water Wells
- Sand B Monitor Wells
- Sands B, C & D Exemption Area
- Sand A Exemption Area
- 1/4 mile AOR
- 50' buffer on NW fault
- Goliad Permit Boundary
- Ore Bodies
- Sand A
- Sand B
- Sand C
- Sand D

Sands B, C, & D Exemption approximate boundary\*

Point	X	Y	Point	X	Y	Point	X	Y
1	-97.35773	28.8663	9	-97.35226	28.87005	17	-97.3491	28.86093
2	-97.35745	28.86652	10	-97.35113	28.87071	18	-97.3499	28.86015
3	-97.35641	28.86711	11	-97.35056	28.87113	19	-97.3516	28.86022
4	-97.35548	28.86756	12	-97.35043	28.87114	20	-97.3558	28.8615
5	-97.3547	28.86772	13	-97.34932	28.87194	21	-97.3564	28.86191
6	-97.35382	28.86835	14	-97.34563	28.87086	22	-97.3578	28.86436
7	-97.35327	28.86876	15	-97.3478	28.86324	23	-97.3576	28.86605
8	-97.35298	28.86899	16	-97.34901	28.86243	24	-97.3577	28.8663

\*All locations traced from georeferenced UEC Map, i.e. not from coordinates.

TNRIS 24000 DRG Goliad County Quadrangles:  
Ander, Mayersville, Weesatche, Yorktown East

\*\* Due to the uncertainty of the exact fault location a conservative 50 foot buffer was used to define the northern edge of the exemption area, along the SE of the NW fault.

## Technical Exemption Area Derivation

As discussed in the Statement of Basis for the June 2014 Goliad Aquifer exemption decision, the approved exemption area is only on the southeast side of NW fault. Due to the uncertainty of the exact fault location a conservative 50 foot buffer to the southeast was used to define the northern edge of the exemption area.

UEC did not supply latitude and longitude points for the requested exemption areas. Therefore the map showing these areas on a topographic map was scanned. The Digital Raster Graphics (DRG) topographic map files were downloaded from the Texas Natural Resources Information System website: <http://www.tnris.org/get-data#drg> for the following quadrangles in Goliad County: Ander, Mayersville, Weesatche and Yorktown East. These files, in GCS North American 1927 Datum, were used to georeference the scanned map.

The fault traces and other outlines were in turn digitized from the georeferenced map, then a 50 foot buffer was added to the NW fault. The two exemption polygons were then split based on the intersection of the southeastern boundary of the 50 foot buffer and the specific exemption polygon. Reference points were generated from the polygon vertices and are included in the tables below.

GIS locations are relative locations, exact locations require a Texas licensed surveyor. The intent is to bound the northern end of the exemption areas on a conservative distance from the downthrown side of the northwest fault.

**Table 1: Sand A Exemption approximate boundary**

Point	X	Y		Point	X	Y
0	-97.355258	28.867592		8	-97.350428	28.871143
1	-97.354717	28.867706		9	-97.349329	28.871947
2	-97.354255	28.868018		10	-97.345631	28.870855
3	-97.353077	28.868901		11	-97.347034	28.869404
4	-97.352978	28.868991		12	-97.350389	28.867619
5	-97.352260	28.870052		13	-97.355006	28.865978
6	-97.351134	28.870681		14	-97.355258	28.867592
7	-97.350562	28.871135				

**Table 2: Sand BCD Exemption approximate boundary**

Point	X	Y		Point	X	Y
1	-97.35773	28.8663		13	-97.34932	28.87194
2	-97.35745	28.86652		14	-97.34563	28.87086
3	-97.35641	28.86711		15	-97.3478	28.86324
4	-97.35548	28.86756		16	-97.34901	28.86243
5	-97.3547	28.86772		17	-97.3491	28.86093
6	-97.35382	28.86835		18	-97.3499	28.86015
7	-97.35327	28.86876		19	-97.3516	28.86022
8	-97.35298	28.86899		20	-97.3558	28.8615
9	-97.35226	28.87005		21	-97.3564	28.86191
10	-97.35113	28.87071		22	-97.3578	28.86436
11	-97.35056	28.87113		23	-97.3576	28.86605
12	-97.35043	28.87114		24	-97.3577	28.8663